

### Amendments to the Claims

This listing of claims will replace all prior versions, and listings of claims in the application. Applicant has submitted a new complete claim set showing marked up claims with insertions indicated by underlining and deletions indicated by strikeouts and/or double bracketing.

Please amend claims 1, 2, 7, 8, 13, 14, 19–27 and 31–34 as follows.

Please add new claims 35–38 as follows.

1. (Currently amended) A method of creating programmable data objects for use in a multi-tier computing architecture, the method comprising:

dragging a graphical representation for a server processing resource from a server explorer module to a visual design surface module to add a processing item to a middle-tier stateless programmable data object being created in the visual design surface module, wherein a client process to communicate with the server processing resource through the middle-tier stateless programmable data object using stateless data transfer;

identifying data schema associated with the server processing resource added to the middle-tier stateless programmable data object in response to the server processing resource being dropped in the visual design surface module;

creating a typed dataset containing data structures corresponding to the data schema associated with the server processing resource;

creating a command adapter to provide data transfer commands within the middle-tier stateless programmable data object between the middle-tier stateless programmable data object and the server processing resource; and

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creating a data transfer connection between the middle-tier stateless programmable data object and the server processing resource.

2. (Currently amended) The method according to claim 1, wherein the method further comprises: creating additional initialization methods to support the items added to the middle-tier stateless programmable data object.

3.-6. (Canceled)

7. (Currently amended) A computing system of creating programmable data objects for use in a multi-tier computing architecture, the computing system comprising:

- a memory module;
- a user interface module;
- a mass storage system; and
- a programmable processing module, the programmable processing module performing a sequence of operations to implement the following:

- dragging a graphical representation for a server processing resource from a server explorer module to a visual design surface module to add a processing item to a middle-tier stateless programmable data object being created in the visual design surface module, wherein a client process to communicate with the server processing resource through the middle-tier stateless programmable data object using stateless data transfer;

- identifying data schema associated with the server processing resource added to the middle-tier stateless programmable data object in response to the server processing resource being dropped in the visual design surface module;

creating a typed dataset containing data structures corresponding to the data schema associated with the server processing resource;

creating a command adapter to provide data transfer commands within the middle-tier stateless programmable data object between the middle-tier stateless programmable data object and the server processing resource; and

creating a data transfer connection between the middle-tier stateless programmable data object and the server processing resource-

8. (Currently amended) The computing system according to claim 7, wherein the sequence of operations further comprises creating additional initialization methods to support the items added to the middle-tier stateless programmable data object.

9.-12. (Canceled)

13. (Currently amended) A computer program product readable by a computing system and encoding instructions for a computing process for creating programmable data objects for use in a multi-tier computing architecture the computing process comprising:

dragging a graphical representation for a server processing resource from a server explorer module to a visual design surface module to add a processing item to a middle-tier stateless programmable data object being created in the visual design surface module, wherein a client process to communicate with the server processing resource through the middle-tier stateless programmable data object using stateless data transfer;

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identifying data schema associated with the server processing resource added to the middle-tier stateless programmable data object in response to the server processing resource being dropped in the visual design surface module;

creating a typed dataset containing data structures corresponding to the data schema associated with the server processing resource;

creating a command adapter to provide data transfer commands within the middle-tier stateless programmable data object between the middle-tier stateless programmable data object and the server processing resource; and

creating a data transfer connection between the middle-tier stateless programmable data object and the server processing resource.

14. (Currently amended) The computer program product according to claim 13, wherein the computing process further comprises creating additional initialization methods to support the items added to the middle-tier stateless programmable data object.

15.-18. (Canceled)

19. (Currently amended) A system for creating programmable data objects for use in a multi-tier computing architecture, the system comprising:

a server explorer module for presenting one or more ~~processing~~ server resources present on a server to a programmer for use in creating a programming object class; and

a visual design surface module for performing the operations associated with creating, editing, and saving a middle-tier stateless programmable data object ~~the programming object~~, the visual design surface module comprising:

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a drag/drop module for enabling a programmer to perform a drag and drop of a server resource onto the visual design surface module, the drag and drop including selecting ~~select~~ a server resource from the server explorer module and ~~place~~ placing the selected server resource within ~~[[a]]~~ the middle-tier stateless programmable data object on the visual design surface module, wherein a client process to communicate with the server resource through the middle-tier stateless programmable data object using stateless data transfer;

a command adapter function generation module for generating a command adapter module ~~a data processing object~~ associated with the drag and drop of ~~[[a]]~~ the server resource;

a typed dataset generation module for generating a typed dataset object associated with the drag and drop of ~~[[a]]~~ the server resource;

an init generation module for generating ~~the set of data processing functions and methods~~ of a data transfer connection between the middle-tier stateless programmable data object and the server resource associated with the drag and drop of ~~[[a]]~~ the server resource; and

a properties edit module for retrieving properties and source code for ~~the various~~ objects within the visual design surface module for editing.

20. (Currently amended) The system according to claim 19, wherein the drag/drop module comprises:

an explorer interface module to select ~~[[a]]~~ the server resource from the server explorer module and place it within ~~a data object~~ the middle-tier stateless programmable data object within the visual design surface module;

a user interface module to perform the visual display and command input operations associated with the drag and drop ~~drag/drop operation~~; and

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a class generation module to cause the visual design surface module to perform the operations to complete the drag and drop ~~drag/drop process~~ of ~~[[a]]~~ the server resource onto the visual design surface module.

21. (Currently amended) The system according to claim 19, wherein the drag/drop module further causes the other processing modules in the visual design surface module to perform their operations to complete the ~~drag/drop process~~ drag and drop of ~~[[a]]~~ the server resource onto the visual design surface module.

22. (Currently amended) The system according to claim 19, wherein the command adapter function generation module comprises:

a GetDS module for generating a GetDataSet function that fills a typed dataset with data obtained from the server resource ~~a corresponding database~~; and

an updateDS module for generating an UpdateDataSet function that updates the server resource ~~a database~~ using the data stored within the typed dataset.

23. (Currently amended) The system according to claim 19, wherein the command adapter function generation module further accepts an updated command adapter module that has been edited by the properties edit module and generates ~~the~~ updated source code for ~~the~~ functions within the command adapter module ~~modules~~.

24. (Currently amended) The system according to claim 19, wherein the typed dataset generation module comprises:

a Table Schema module for generating the table records from ~~the~~ a database schema within the typed dataset object;

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a Relations module for generating the relationship data for the fields within the records within the typed dataset object based upon the corresponding relationship data from the server resource database; and

a Views module for generating the database views data for the records within the typed dataset object based upon the corresponding views data from the server resource database.

25. (Currently amended) The system according to claim 19, wherein the typed dataset generation module further accepts an updated typed dataset module that has been edited by the properties edit module and generates the updated source code for the functions within the typed dataset object module.

26. (Currently amended) The system according to claim 19, wherein the init generation module comprises:

an Init Function module for generating the processing functions and methods within the middle-tier stateless programmable data object associated with the command adapter modules;

an InitDataSet module for generating the processing functions and methods within ~~[[a]]~~ the middle-tier stateless programmable data object module associated with the type dataset class; and

an InitConnection module for generating the processing functions and methods within the middle-tier stateless programmable data object associated with the data transfer connection between the middle-tier stateless programmable data object and the ~~database~~ server resource.

27. (Currently amended) The system according to claim 19, wherein the init generation module further accepts an updated Code Generated Method module that has been edited by the properties edit module and generates the updated source code for the functions and methods of the data transfer connection within the command adapter modules.

28.-30. (Canceled)

31. (Currently amended) The method according to claim 1, further comprising:  
inserting a database connection module that creates the data transfer connection between the middle-tier stateless programmable data object and a database the server processing resource when the dragged item is a database table within the database server processing resource, wherein the database connection module comprises:

a data connection object for creating and managing the data transfer connection between the middle-tier stateless programmable data object and the database the server processing resource;

a managed resource module for providing the data connection object with address and identification information to establish the data transfer connection; and

a persistent data storage for maintaining the address and identification information used by the managed resource module[;];

~~editing the processing items within the visual design surface module, wherein the processing items comprise properties and processing instruction source code;~~

~~— updating the processing items edited within the visual design surface module;~~

~~— updating the typed dataset within the visual design surface module;~~

~~— updating the command adapters within the visual design surface module;~~

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~~—— identifying any other processing items containing references to the data structures and functions edited; and~~

~~—— updating the identified items containing references to data structures and functions edited to make all references consistent with each other.~~

32. (Currently amended) The computing system according to claim 7, wherein the programmable processing module further performs the following:

inserting a database connection module that creates the data transfer connection between the middle-tier stateless programmable data object and a ~~database~~ the server processing resource when the dragged item is a database table within the ~~database~~ server processing resource, wherein the database connection module comprises:

a data connection object for creating and managing the data transfer connection between the middle-tier stateless programmable data object and the ~~database~~ the server processing resource;

a managed resource module for providing the data connection object with address and identification information to establish the data transfer connection; and

a persistent data storage for maintaining the address and identification information used by the managed resource module[;]] .

~~editing the processing items within the visual design surface module, wherein the processing items comprise properties and processing instruction source code;~~

~~—— updating the processing items edited within the visual design surface module;~~

~~—— updating the typed dataset within the visual design surface module;~~

~~—— updating the command adapters within the visual design surface module;~~

~~—— identifying any other processing items containing references to data structures and functions edited; and~~

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~~—updating the identified items containing references to the data structures and functions edited to make all references consistent with each other.~~

33. (Currently amended) The computer program product according to claim 13, wherein the computing process further comprises:

inserting a database connection module that creates the data transfer connection between the middle-tier stateless programmable data object and a ~~database~~ the server processing resource when the dragged item is a database table within the ~~database~~ server processing resource, wherein the database connection module comprises:

a data connection object for creating and managing the data transfer connection between the middle-tier stateless programmable data object and the database server processing resource;

a managed resource module for providing the data connection object with address and identification information to establish the data transfer connection; and

a persistent data storage for maintaining the address and identification information used by the managed resource module[;] .

~~editing the processing items within the visual design surface module, wherein the processing items comprise properties and processing instruction source code;~~

~~—updating the processing items edited within the visual design surface module;~~

~~—updating the typed dataset within the visual design surface module;~~

~~—updating the command adapters within the visual design surface module;~~

~~—identifying any other processing items containing references to data structures and functions edited; and~~

~~—updating the identified items containing references to the data structures and functions edited to make all references consistent with each other.~~

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34. (Currently amended) The system according to claim 19, wherein the properties edit module further comprises:

- a Properties Retrieval module for retrieving the properties and source code for the ~~various~~ objects within the visual design surface module for editing[[,]] ;

- a User Interface module for presenting the properties and source code to a programmer, and accepting edits from the programmer[[,]] ; and

- a ~~class-update~~ Class Update module for identifying all other items within the visual design surface module that are affected by the changes made to the edited item[[,]] and updating the identified items consistent with the edits made to the edited item<sub>1</sub>, and

further comprising

- a ~~database connection module for creating a data transfer connection between the programmable data object and a database when the dragged item is a database table within the database, the database connection module including~~

- a ~~data connection object for creating and managing the data transfer connection between the programmable data object and the database,~~

- a ~~managed resource module for providing the data connection object with address and identification information to establish the data transfer connection, and~~

- a ~~persistent data storage for maintaining the address and identification information used by the managed resource module.~~

35. (New) The method according to claim 1, further comprising:

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editing the processing items within the visual design surface module, wherein the processing items comprise properties and processing instruction source code;

updating the processing items edited within the visual design surface module;

updating the typed dataset within the visual design surface module;

updating the command adapters within the visual design surface module;

identifying any other processing items containing references to the data structures and functions edited; and

updating the identified items containing references to data structures and functions edited to make all references consistent with each other.

36. (New) The computing system of claim 7 wherein the sequence of operations further comprises:

editing the processing items within the visual design surface module, wherein the processing items comprise properties and processing instruction source code;

updating the processing items edited within the visual design surface module;

updating the typed dataset within the visual design surface module;

updating the command adapters within the visual design surface module;

identifying any other processing items containing references to data structures and functions edited; and

updating the identified items containing references to the data structures and functions edited to make all references consistent with each other.

37. (New) The computer program product according to claim 13, wherein the computing process further comprises:

editing the processing items within the visual design surface module, wherein the processing items comprise properties and processing instruction source code;

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- updating the processing items edited within the visual design surface module;
- updating the typed dataset within the visual design surface module;
- updating the command adapters within the visual design surface module;
- identifying any other processing items containing references to data structures and functions edited; and
- updating the identified items containing references to the data structures and functions edited to make all references consistent with each other.

38. (New) The system according to claim 19, further comprising a database connection module for creating the data transfer connection between the middle-tier stateless programmable data object and the server resource, wherein the server resource includes a database table, the database connection module including:

- a data connection object for creating and managing the data transfer connection between the middle-tier stateless programmable data object and the server resource;

- a managed resource module for providing the data connection object with address and identification information to establish the data transfer connection; and

- a persistent data storage for maintaining the address and identification information used by the managed resource module.